FIVE-YEAR REVIEW REPORT

Midco I, GARY, INDIANA

Prepared by:

The United States Environmental Protection Agency (EPA)
Region V, Superfund Division

I. INTRODUCTION

This report presents the results of a Five-Year Review for the Midco I site located at 7400 W. 15th Avenue in Gary, Indiana. The purpose of this review is to evaluate whether the remedial action at Midco I remains protective of public health and the environment, is functioning as designed, and is being operated and maintained properly. This review was conducted pursuant to Section 121 (c) of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and Section 300.430(f)(4)(ii) of the National Contingency Plan, which require periodic review (at least once every five years) for sites where hazardous substances, pollutants or contaminants will remain above levels that would allow unlimited use and unrestricted exposure after completion of the remedial action.

The remedial action that EPA selected for the Midco I site will result in hazardous substances remaining in soils above concentrations that would allow unlimited use and unrestricted exposure. Therefore, a Five-Year Review is required for Midco I. Since remedial actions are ongoing at Midco I, a Type 1A review has been conducted in accordance with OSWER Directive 9355.7-02A, July 26, 1994. A Type 1A review is designed for sites with ongoing actions and do not include tasks that are duplicative or unnecessary because of the level of review and oversight that EPA normally conducts for ongoing remedial actions. Examples of tasks that are not included in Type 1A review are site visits specifically for the Five-Year Review and standards review. More thorough evaluations possibly including updated risk calculations and sampling can be conducted if the initial evaluation indicates that it is necessary. This report will be placed in the site files located at EPA's office at 77 W. Jackson Boulevard, Chicago, Illinois, and in the local repository for Midco I at the City of Gary Public Library.

II. SITE HISTORY AND CHARACTERISTICS

The Midco I operations were primarily conducted on an approximately four acre area at 7400 W. 15th Avenue, Gary, Indiana from 1973 through 1979. Operations included storage and disposal of thousands of drums and a number of tanks of chemical wastes. Wastes were dumped and spilled onto and into the ground. Much of the waste handled was from the paint industry. In December 1976, a large fire destroyed thousands of drums containing chemical wastes at Midco I and resulted in more spillage. Following the fire, the Midco I operator relocated to Midco II, which is another Superfund site located at 5900 Industrial Highway, Gary, Indiana. However, hazardous waste operations at Midco I were reinitiated in October 1977 and conducted through 1979 by a new operator.

EPA installed a fence around Midco I 1981. In 1982, EPA removed all surface wastes from Midco I including thousands of drums and a number of tanks containing chemical wastes. EPA's removal action also included removing the top six inches to one foot of contaminated soil, and placement of clay soil over much of the site.

Under a 1985 Consent Decree, a Remedial Investigation/Feasibility Study (RI/FS) was completed between 1985 and 1989 at both Midco I and Midco II. The RI showed that the ground water at Midco I and portions of the subsurface soils were highly contaminated by volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and cyanide. However, the ground water movement is slow, and as a result the ground water contamination had not migrated far from the site.

Based on the results of the RI/FS, EPA selected a remedy for Midco I in Record of Decision (ROD) in 1989. A ROD for Midco II was processed at the same time. EPA repaired the fence around Midco I in 1991. The remedies for Midco I and Midco II were revised by ROD Amendments in 1992, and by an Explanation of Significant Differences in 1996. The State of Indiana concurred in all of the decision documents.

III. REMEDIAL ACTION REQUIREMENTS

The EPA approved remedy for Midco I includes the following components:

- Excavation and on-site S/S of contaminated sediments and underlying soils in defined wetland areas surrounding Midco I;

- Construction and operation of a ground water extraction system to cleanup contaminated ground water;

- Construction and operation of a deep underground injection well for disposal of the contaminated ground water, and treatment prior to deep well injection, if necessary;

- Treatment of highly contaminated soil by a combination of solidification/stabilization (S/S) and soil vapor extraction (SVE);

- Construction of a final cover, access restrictions, deed restrictions and monitoring.

The following table presents the cleanup and performance criteria applying to each of these actions:

ACTION/NAME OF CRITERIA	APPLICABILITY OF CRITERIA	QUANTIFICATION OF CRITERIA
Sediment and soil excavation/soil cleanup action levels (soil CALS)	After the initial excavation of the sediments, if the underlying soils exceeds the soil CALs, further excavation is required	Cumulative, lifetime, incremental cancer risk (CR) = 10^{-6} ; hazard index for non-carcinogenic effect (HI) = 1.0;[1] and lead = 500 mg/kg
Ground water extraction/ground water cleanup action levels (GWCALs)	Ground water capture zone must include all ground water exceeding the GWCALs, and extraction must continue until the ground water no longer exceeds the GWCALs	Primary MCLs (40 CFR 121); CR = 10^{-6}; HI = 1.0[2]; and Ambient Water Quality Criteria X 3.9
Deep well injection/ Maximum Allowable Concentrations (MACs)	The extracted ground water must not exceed the MACs prior to deep well injection	6.3 times the Health Based Levels used for RCRA delisting demonstrations in July 1991 (see attachment), except the MAC for 1,1-dichloroethane has been revised to 880 ug/l[3]
Soil treatment/ minimum areas for treatment	Soils within these defined areas must be treated by S/S and SVE	Areas outlined on a map in the Consent Decree
Soil Treatment/ soil treatment action levels (STALS)	Outside of defined minimum areas for treatment, if STALs are exceeded soil must be treated by S/S and/or SVE	CR = 5 X 10^{-4}; HI = 1.0[1]; and lead = 1000 mg/kg.
SVE as a separate operation/SVE performance standards	Must be attained in soil following completion of SVE	97% reduction in total volatile organic compounds (VOCs)

[1] The CR and HI are calculated assuming hypothetical lifetime residential exposure to soils having the sampling point concentrations.

[2] The CR and HI are calculated assuming hypothetical lifetime exposure to residential water having the sampling point concentrations.

[3] By not exceeding the MACs the ground water meets the equivalent of RCRA delisting requirements and is considered non-hazardous pursuant to RCRA.

SVE using in-situ S/S apparatus/SVE performance standards	Must be attained in soil following soil mixing and air injection using the in-situ apparatus	90% reduction in the following VOCs: benzene, methylene chloride, trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, trans-1,2-dichloroethylene, and vinyl chloride
S/S/Minimum Performance Standards	Where S/S is required, must be met after completion of S/S	Metals $\geq$ 90-99% reduction in mobility[4]; SVOCs $\geq$ 50% reduction[5]; hydraulic conductivity $\leq 10^{-7}$ cm/sec; unconfined compressive strength $\geq$ 50psi; wet-dry durability $<$ 10% weight loss; freeze-thaw durability $<$10% weight loss.
Air emissions/air emission Criteria	Air emissions must not have the potential to cause exceedance of these risk levels.[6]	CR = 1 X 10^{-7} ; HI = 1.0; and
Fugitive dust/ fugitive dust action levels	If fugitive dust exceeds these concentrations, corrective measures must be taken to suppress the fugitive dust	Sediment excavation: 0.40 mg/m^3[7]; S/S: 0.07 mg/m^3; soil cover: 0.065 mg/m^3.
Final cover	Extent of final cover	Must cover the entire site

[4]The reduction in mobility is measured by comparing before and after treatment results of the Synthetic Precipitation Leaching procedure (SW-846, Method 1312).

[5] The reduction refers to a comparison of the concentration in methylene chloride extract from soil before treatment to the concentration after treatment. The reduction criteria applies to the following compounds: anthracene, bis(2-ethylhexyl)phthalate, ethyl benzene, fluoranthene, naphthalene phenanthrene, phenol, toluene and xylene.

[6] The risk applies to a hypothetical resident at the property boundary. The criteria applies separately to air emissions from the ground water treatment system, the S/S system, SVE, and excavation activities.

[7] These are the concentrations of fugitive dust that will provide protection to the a hypothetical resident at the property boundary to CR = 1 X 10^{-7} and a HI = 1.0, assuming soil concentrations equal the average of soil boring and test trench samples collected during the remedial investigation.

IV. STATUS OF REMEDIAL ACTIONS

EPA, the State of Indiana and Settling Defendants entered into an agreement on the final remedial actions for both Midco I and Midco II in a Consent Decree, which became effective in 1992. The Settling Defendants formed the Midco Remedial Corporation (MRC) to actually carry out the remedial actions. The MRC performed the remedial design for the ground water extraction, treatment and deep well injection system from 1993-1994. Ground water sampling was conducted during the spring of 1993 to determine the required extent of the capture zone and to evaluate treatment options. Based on this sampling, it was determined that it would be unnecessary to treat metals, but that treatment of certain organic compounds would be necessary to meet the MACs. The MRC proposed and EPA approved a treatment system consisting of filtration and organic treatment using an ultraviolet light/hydrogen peroxide (UV/HP) system. The approved design provided that, before continuous treatment and deep well injection could be initiated, one-day, three-day, and four-week tests must demonstrate that the system could consistently meet the MACs. The design also included monthly sampling of the effluent and hourly sampling for indicator parameters using an on-site gas chromatograph once continuous operation was initiated

In 1993, the MRC partially completed the initial sediment excavation and consolidation of sediments onto the site for eventual treatment by S/S. In 1993-1994 the MRC constructed the deep injection well. In 1994-95 the MRC constructed the ground water extraction, treatment and injection system.

In the spring of 1995, the MRC conducted a number of one-day tests on the system. After repeated testing using more and more severe treatment conditions, it was concluded that the UV/HP system could not meet the MAC for 1,1-dichloroethane of 2.5 ug/l. The MAC in the 1992 ROD Amendment for 1,1-dichloroethane was based on an estimate of its carcinogenic potency in a 1985 EPA report. EPA risk assessors carefully reviewed the most up to date information on the toxicity of 1,1-dichloroethane, and concluded that it was no longer justifiable to characterize 1,1-dichloroethane as a carcinogenic compound. They recommended that the MAC be revised to 880 ug/l. This change in the MAC for 1,1-dichloroethane was formalized in an Explanation of Significant Differences (ESD) issued on January 9, 1996.

Subsequent to issuance of the ESD, the MRC proceeded with additional one-day tests, but found that it could not meet the MAC for methylene chloride. In response to this problem during the summer of 1996, the MRC added a small air stripper with vapor phase carbon adsorption to treat the ground water following the UV/HP unit.; Subsequent one-day three-day and four-week tests demonstrated that, with the addition of the air stripper, the treatment system could consistently meet all of the MACs. Continuous operation of the ground water extraction treatment and deep well injection system was initiated in February 1997. Following start-up, air emissions and ambient air were periodically sampled. In addition, the air emissions were continuously monitored using a flame ionization detector.

Under the Consent Decree, the MRC is required to initiate work on the soil treatment between February 1999 and February 2000 depending on monitoring results. The MRC has gone ahead with soil sampling related to the soil treatment. EPA has been conducting treatability studies to evaluate the effectiveness of S/S and to identify effective binders.

V. PROTECTIVENESS EVALUATION

ACCESS RESTRICTIONS AND DEED RESTRICTIONS

The soil and ground water treatment and containment objectives for completion of the remedial action have not yet been attained. However, in the interim the site remains protective of public health due to access restrictions and deed restrictions. Access to the site is restricted by a fence. In addition, personnel are present on the site to operate the ground water treatment system almost every day. These personnel will also be able to observe evidence of trespassing on the site and initiate corrective measures. In addition, EPA representatives periodically visit the site. Deed restrictions have been filed in the land records of Lake County, Indiana.

EPA’s last on site inspection was on April 30, 1998. During this inspection, EPA identified the following concerns:

- Two containers of spent carbon were observed in back of the Midco I treatment building. This is inconsistent with Section II.G.1.h of Appendix I of the Consent Decree, which states that “For any carbon adsorption unit that is being or has been used for control of air emissions ... access to the unit shall be restricted using a fence or other means approved by EPA within three feet of the column...”. In addition, Section 19.6.5 of the Investigation and Monitoring Plan (IMP) states that access to the spent carbon storage tank will be limited by a chain link fence within ten feet of the storage tank.

- The EPA inspector was told that the spent carbon and spent filters were going to be disposed under the site cover. This is inconsistent with Section II.G.3 of Appendix I of the Consent Decree, which states that any residuals from the ground water treatment process shall be considered a RCRA hazardous waste, and must be stored on-site and disposed of or treated on-site or off-site in accordance with RCRA regulations, including the Land Disposal Restrictions. This is also inconsistent with Section 19.6.5 of the IMP, which states that “spent activated carbon canisters ... will be collected by the respective supplier for disposal or regeneration of the carbon.” EPA should be consulted prior to arranging this off-site disposal.

- Two rusty drums were observed along the east fence of Midco I. One drum was lying on its side and contained a solidified material. The contents of these drums need to be properly characterized and the wastes properly stored on-site and disposed off-site. EPA should be consulted prior to the off-site disposal.

- The fence around the drum storage area at Midco I needed to be repaired, and the front gate to Midco I was left open throughout the inspection. Although personnel were present on the site, the MRC needs to assure that unauthorized persons do not enter through the gate.

The MRC responded to these concerns by installing a new metal fence around the drum storage area and moving the spent carbon canisters into that area. The MRC committed to overpacking the drums and moving them into the drum storage area. One of the rusty drums was empty, and the other was sampled, but nothing was detected. The MRC has committed to evaluating options for disposal of the filter media and complying with the requirement to regenerate spent carbon. To better address the potential for unauthorized entrance, the MRC has switched all deliveries to the Midco II site and has ordered signs with telephone numbers to post on the Midco I entrance gate. As a result, the Midco I entrance gate will remain closed and locked during the day when it is not being used.

SEDIMENT/SOIL EXCAVATION

In 1993, the MRC conducted partial excavation of the sediments in the areas defined in the Consent Decree. An EPA contractor oversaw this action. From 3 to 12 inches of sediment/soils were removed, and the excavation extended down to the water table and into the native sand in all areas. The excavated sediment/soils were placed on the Midco I site in the minimum areas for soil treatment. The sediments were mixed with ground corn cobs to absorb free water, and a temporary flexible membrane liner has been placed over the pile to prevent erosion. The condition of the flexible membrane liner is regularly inspected.

During the excavation, ambient air samples were collected for fugitive dust and VOCs. The fugitive dust action level was exceeded on two days, but active corrective measures did not have to be taken because it rained during the evenings on those two days. The VOC samples did not exceed the CR = 10^{-7} or HI = 1.0 criteria.

Following the excavation, confirmatory samples were collected to evaluate attainment of the soil CALs. The sampling, analysis and data validation was conducted in accordance with an EPA approved Quality Assurance Project Plan. The sampling was overseen by an EPA contractor. Fourteen of the twenty-seven confirmatory samples exceeded the CR = 10^{-6} soil CAL. This was due to the following detections:

- Carcinogenic polyaromatic hydrocarbon in 13 samples with CR as high as 4 X 10^{-4} and total concentration as high as 22 mg/kg. However, three of the highest risk locations were G2, G3 and G4, all of which may be affected by run-off from off-site sources (see the attached Figure 6 from the Sediment Excavation Report).

- Polychlorinated biphenyls in 2 samples (B03 and B04) with CR as high as 1 X 10^{-4}, and a concentration as high as 2.6 mg/kg.

- Bis(2-ethylhexyl)phthalate in 2 samples (E02 and E03) with CR as high as 3.2 X 10^{-6}, and a concentration as high as 19 mg/kg.

In addition, one of the fourteen samples (F04) exceeded the soil CAL for lead (621 mg/kg).

Because of the difficulties in excavating soil below the water table, limitation of storage area on the site, and uncertainty about the extent of additional excavation that would be necessary to meet the soil CALs, the MRC proposed that the site fence be extended around the sediment areas (see Figure 6) instead of conducting further excavation. Since the calculated risks were based on lifetime residential exposures, EPA concurs that the fence would provide sufficient protection to public health. However, initial screening of the soil data indicates that concentrations of chrysene, phenanthrene, total polyaromatic hydrocarbons, lead, manganese, chromium, copper and nickel are high enough in some samples to cause severe effects on invertebrates (see attached December 1, 1997 memorandum from Edward Karecki of the United States Fish and Wildlife Service). Therefore, it is possible that there is an ongoing negative impact on wildlife that live or feed in the contaminated portion of the ditch due to exposure to contaminants, although the ground water extraction system will prevent any off-site migration of these contaminants through the ground water, and the area is flat enough so that off-site migration in surface water will be insignificant.

As an interim measure, EPA has allowed the MRC to enclose the sediment areas with a fence rather than conducting further excavation. During design of the site cover, EPA intends to require further evaluation of the ecological risks. Options that are likely to be considered include covering the contaminated sediment areas with clean soils, and conducting further excavation in the sediment areas and containing the excavated soils under the site cover.

DEEP WELL INJECTION

Protection of underground sources of drinking water is assured by complying with the requirements of the EPA, Underground Injection Control program. The measures being implemented to comply with these requirements are summarized in the Midco Remedial Corporation, Midco I and Midco II Superfund Sites, Gary, Indiana. Underground Injection Control Permit Application, dated June 1993 (prepared by Golden Environmental Services, Inc.), as updated by the Five Year Underground Injection Well Reapplication Midco WDW-1, Midco Remedial Corporation, dated March 20, 1998 (prepared by ERM EnviroClean-North Central, Inc). These documents have been reviewed and approved by EPA. Some of the requirements for deep well injection include:

- Injection must be below the B-cap into the lower Mount Simon formation, which is separated hydraulically from the lowermost USDW by the B-cap and the upper Mount Simon formation;
- Location of and correction of any improperly sealed, completed or abandoned wells that penetrate the injection zone within a two mile radius of the injection well;
- Casing and cementing requirements;

- Maximum pressure and flow rate requirements;
- Testing to assure that the injectate is not incompatible with the formation;
- Maintenance and operator requirements;
- Maintenance of a positive pressure on the annulus fluid that is at least 100 psi greater than the injection pressure throughout the length of the tubing;
- Continuous monitoring of injection pressure, flow rate, and annulus pressure;
- Annual and five-year mechanical integrity testing (with oversight by EPA);
- Monthly sampling for detailed analysis and hourly analysis for methylene chloride on the treatment system effluent, to assure compliance with the MACs;
- Alarms and shut-off requirements;
- Submission of monthly reports to EPA.

The geologic location of the deep injection well does not meet the stringent requirements for deep injection of hazardous wastes (as defined by the Resource Conservation and Recovery Act). Therefore, the well is a Class I non-hazardous injection well, which can only inject non-hazardous fluids. To assure that the ground water from Midco I is non-hazardous it is treated by filtration, UV/HP and air stripping to meet the MACs. Initial compliance with the MACs was assured by completing a one-day, a three-day and a four-week test. During the one-day test, three samples (every 8 hours) of the treated ground water were collected for detailed analysis and the treated ground water collected in a tank so that further treatment could be provided if the MACs were not attained. Three samples (one each day) were collected during the three day test and four samples (one each week) during the four-week test. During the normal operation of the treatment system, a sample of the effluent is collected once a month and subjected to a detailed analysis. In addition, during operation of the treatment system, an on-site gas chromatograph analyzes the effluent for methylene chloride each hour. If the gas chromatograph detects an exceedance of the MAC, it automatically shuts down the treatment system. An EPA contractor oversaw the one-day, three-day and four-week tests and periodically oversees the monthly sampling, while also inspecting operation of the system, the gas chromatograph and other items. The samples subjected to detailed analysis must be analyzed and validated in accordance with the EPA approved Quality Assurance Project Plan. An EPA contractor has periodically audited the data validation.

GROUND WATER CAPTURE ZONE

The MRC has conducted an evaluation of the extent of the capture zone for the Midco I ground water extraction system. The latest evaluation is summarized in a report entitled Capture Zone Evaluation Report, Midco I Site, dated March 2, 1998 by Environmental Resources Management, North Central, Inc. (ERM). Although the procedures used for this evaluation have not been fully satisfactory to EPA or IDEM, this evaluation has demonstrated that the target capture zone is usually not being achieved, but that the most contaminated ground water is being contained (compare the attached Figure 1 and Figure 25 and 26 from the Capture Zone Evaluation Report).

EPA's investigation into why the target capture zone was not being achieved, identified that the ground water extraction rate had consistently been less than the design rate. Based on modeling, the Pre-Design Report had predicted that a constant extraction rate of 16.5 gpm would be needed to attain the target capture zone. Inspection of the Monthly Progress Reports indicated that from January 1 through July 31, 1997, the average extraction rate was only 9.3 gpm. The average extraction rate improved somewhat to 11.6 gpm between August 1 and December 31, 1997, but the extraction rate was still well below the design extraction rate. The low extraction rates are due both to an inability to consistently reach the design extraction rate and to an abundance of down-times. To address this deficiency, in a letter dated February 24, 1998, EPA required that the MRC submit a Corrective Action Report, consisting of a plan to increase the operating flow rate and to reduce down-times.

In response, ERM has submitted the Ground Water Extraction and Treatment System Corrective Action Report (CAR) to identify potential causes of the low average extraction rates and propose additional evaluation. Later ERM submitted the Ground Water Extraction and Treatment Systems Corrective Action Recommendations Report (CARR) to present the results of the evaluation and make final recommendations. The Corrective Action Report identified a number of reasons for the reduced flow rates, including: high maintenance requirements on the extraction well pumps; rapid pressure build-up on pretreatment filters due to solids and oil in the aquifer, rapid fouling of the UV lamps which requires frequent cleaning cycles (during which the water is partially treated and recycled to the front of the UV/HP unit), and delayed response to shut-downs occurring when the system is not manned.

The MRC has already implemented a number of actions to increase the extraction rates including:
- cleaning, upgrading and replacing some extraction well pumps and piping;
- rehabilitating one extraction well;
- adjusting the schedule for replacement of prefilters;
- correcting communication problems between Midco I and Midco II;
- other additional inspection and maintenance.

The CARR was submitted on August 31, 1998 and is still under review by EPA and IDEM. The CARR recommends the following additional actions to increase average extraction rates, subject to EPA approval:
- improvement of the extraction well maintenance and rehabilitation procedures;
- additional improvements to the extraction well pumps;
- discharging the UV tube cleaning water instead of recycling it; and
- arranging for an on-call operator to respond quickly to operational problems occurring when the system is unmanned.

Other improvements, including operating the HP/UV system at a higher flow rate are still under review.

Since April 1998, the average monthly ground water extraction rates have increased to 16.7 gpm in May, 14.2 gpm in June, 13.3 gpm in July, and 17.2 gpm in August. When it is determined that the ground water extraction and treatment system can consistently achieve the design flow rate, the capture zone evaluation will be repeated. An EPA contractor has overseen the field work for the capture zone evaluation. ERM has proposed repeating the capture zone evaluation starting in April 1999. EPA and IDEM will be working with MRC to improve the capture zone evaluation methodology.

The characteristics of the peripheral ground water which is not being captured is best represented by monitoring well clusters G, K and N. During the annual ground water sampling in March 1997 the only parameters exceeding the GWCALs in these monitoring wells are summarized below:

- G30: barium (3,380 ug/l), iron (10,200 ug/l) and nickel (1,590 ug/l);
- K10: iron (9,400 ug/l);
- K30: iron (4,600 ug/l);
- N30: chromium (137 ug/l) and iron (4,400 ug/l).

With the exception of the parameters listed above, the most highly contaminated ground water at the site, including all of the VOC contamination is being contained by the ground water extraction system. Because the ground water velocity is slow at the site (estimated to be 70 feet/year in the Remedial Investigation), it is unlikely that significant contamination has migrated outside of the target capture zone due to failure to fully achieve the target capture zone during the first year of operation. In addition, there are no ground water users in the immediate vicinity of the site. It is expected that the full capture zone will be attained once the ground water extraction system consistently meets the design extraction rate. The average extraction rates during May and August exceeded the design rate.

GROUND WATER CLEANUP

The results of the latest annual ground water monitoring event indicates that the ground water at the site is still highly contaminated (see the attached Tables 4-2 and 4-3 from the 1998 Annual Ground Water Monitoring, Midco I and Midco II Sites, August 1998 by ERM). Although there is insufficient information to draw conclusions regarding trends in the ground water parameters, Table 4-3 indicates that copper, nickel, cyanide, and some VOCs may be decreasing. An EPA contractor has been overseeing the annual ground water sampling. The ground water analysis and data validation is conducted in accordance with the EPA approved Quality Assurance Project Plan. An EPA contractor sometimes audits the data validation.

AIR EMISSIONS FROM GROUND WATER TREATMENT SYSTEM

Ambient air samples were collected upwind and downwind from the site six times during the first three months of operation of the ground water treatment system (every week for the first month, and every month for the next two months). In addition, air emission samples were collected six times during the first three months of operation (every two weeks). This air data is presented and evaluated in a report from ERM dated August 4, 1998. The August 4, 1998 report demonstrates that air emissions were meeting the CR $=10^{-7}$ and HI = 1.0 criteria. In addition, the emissions from the carbon adsorption unit is monitored every 30 minutes with a flame ionization detector. The flame ionization detector is designed to trigger change out of spent carbon prior to exceedance of the air emission criteria.

SOIL TREATMENT AND SITE COVER

The soil treatment and subsequent construction of the site cover over the entire site has not been initiated. As a result, high concentrations of contaminants remain in the soil on the site. This contamination is primarily in the subsurface soils; so off-site migration due to wind and surface water erosion is not significant. As mentioned above the access restrictions and deed notifications provide protection of the public health and environment from the soil contamination during the interim period before the treatment and covering is completed. In addition, health and safety procedures that are being implemented at the site are preventing significant exposures to on-site workers.

VI. RECOMMENDATIONS

The Midco I site is being regularly inspected. Deficiencies in access restrictions are being routinely addressed. The initial sediment and underlying soil excavation has been completed, and the excavated sediment/soils are being temporarily stored in a safe manner on-site. Much of the soils underlying the excavated sediments exceed the soil CALs. At least as a temporary measure, these soils have been enclosed in a fence. The fence is adequate to protect from human health. Ecological threats will be further evaluated and addressed during the design of the site cover.

All required safeguards required to prevent contamination of drinking water aquifers due to the deep well injection are being implemented. This has included extensive initial sampling to demonstrate that the treatment system can consistently meet the MACs. In addition, monthly sampling with detailed analysis and hourly analysis for methylene chloride is being performed during continuous operation of the system. The system is designed to automatically shut-down if the methylene chloride results approach the MAC for methylene chloride.

The target ground water capture zone is not being attained. However, this is not causing a significant off-site human health or environmental risk at this time. The failure to attain the target capture zone is likely due to the extraction and treatment system not attaining the design flow rate. The MRC is now in the process of evaluating and correcting the flow rate problem.

The ground water extraction and treatment system is succeeding in meeting the objective of containing and removing the most contaminated ground water from the site, and providing sufficient treatment to meet the MACs prior to deep well injection. The system will have to operate for many years to meet the GWCALs.

The ambient air and air emission data demonstrates that the CR = 10^{-7} and HI = 1.0 criteria are being met. This included consideration of the inhalation carcinogenic potency factor for vinyl chloride, even though this was not included in the Consent Decree and Record of Decision due to an oversight. In addition, the sediment excavation complied with the fugitive dust action levels. The fugitive dust action levels used the 41 $(mg/kg \times d)^{-1}$ inhalation carcinogenic potency factor for hexavalent chromium even though this was mistakenly recorded as 4.1 $(mg/kg \times d)^{-1}$ in the Consent Decree and Record of Decision due to an oversight. EPA plans to correct the carcinogenic potency factors for vinyl chloride and hexavalent chromium in the Consent Decree and Record of Decision in the near future.

VII. STATEMENT ON PROTECTIVENESS AND FUTURE REVIEWS

I certify that during the interim period (until the final soil treatment and site cover requirements are implemented, and until corrective measures are implemented to increase the ground water extraction flow rate and to achieve the target capture zone) the remedial actions taken at this site are providing protection to human health and the environment. Furthermore, the ground water extraction system is making progress in cleaning up the shallow ground water.

The next five-year review will be conducted by September 2003.

Wm. E. Muno 10/29/98

William E. Muno, Director Superfund Division
Region V, EPA

ATTACHMENTS:

- Health Based Levels and Solubilities For Constituents of Concern in Delisting Petitions, July 1991.

- Figure 1 from the Sediment Excavation Report, Approximate Sediment Area Excavation Boundaries, Midco II Site, Gary, Indiana.

- Figure 6 from the Sediment Excavation Report, Extended Fence, Midco I Site, Gary, Indiana.

- Memorandum on "Comments on the Sediment Excavation Report, Midco I and II Sites, Gary, Indiana", dated December 1, 1997 by Edward Karecki, U.S. Fish and Wildlife Service.

- Figure 1 from Capture Zone Evaluation Report, Midco I Site, Gary, Indiana, Site Layout Showing Target Capture Zone, Extraction Wells and Shallow Monitoring Wells, Midco I Site, Gary, Indiana.

- Figure 25 from Capture Zone Evaluation Report, Midco I Site, Gary, Indiana, Shallow Piezometric Surface and Capture Zone of September 16, 1997, Midco I, Gary Indiana.

- Figure 26 from Capture Zone Evaluation Report, Midco I Site, Gary, Indiana, Deep Piezometric Surface and Capture Zone of September 16, 1997, Midco I, Gary Indiana.

- Tables 4-2 and 4-3 from the 1998 Annual Monitoring Report, Midco I and Midco II Sites, Gary, Indiana, Summary of the Comparison of Analytical Results with the Clean-Up Action Levels, and Summary of Target Compound List/Target Analyte List Results and Comparison with Previously Collected Data, respectively

HEALTH-BASED LEVELS AND SOLUBILITIES FOR CONSTITUENTS OF CONCERN IN DELISTING PETITIONS
July 1991

CAS	No.		Compound	HBL (mg/l)	Ref.	Solubility (mg/l) (in H_2O at 25°C)	Ref.
83	32	9	Acenaphthene	2	26	3.42	6
67	64	1	Acetone	4	4	$1.0x10^{6}$	6
75	05	8	Acetonitrile	$2x10^{-1}$	4	$1.0x10^{6}$	6
98	86	2	Acetophenone	4	4	$5.5x10^{3}$	15
107	02	8	Acrolein	$5x10^{-1}$	37	$5x10^{5}$	2
79	06	1	Acrylamide	Treatment Technique	42	$>1x10^{6}$	15
107	13	1	Acrylonitrile	$6x10^{-5}$	5	$7.9x10^{4}$	6
309	00	2	Aldrin	$2x10^{-6}$	5	$1.8x10^{-1}$	6
62	53	3	Aniline (Benzeneamine)	$6x10^{-3}$	5	$3.5x10^{4}$	2
7440	36	0	Antimony	$1x10^{-2}$	27		
140	57	8	Aramite	$1x10^{-3}$	26		
7440	38	2	Arsenic	$5x10^{-2}$	13		
7440	39	3	Barium	1	13		
56	55	3	Benz(a)anthracene	$1x10^{-5}$	16	$5.7x10^{-3}$	6
71	43	2	Benzene	$5x10^{-3}$	14	$1.75x10^{3}$	6
92	87	5	Benzidine	$2x10^{-7}$	5	$4.0x10^{2}$	6
50	32	8	Benzo(a)pyrene	$2x10^{-4}$	27	$1.2x10^{-3}$	6
205	99	2	Benzo(b)fluoranthene	$2x10^{-5}$	8	$1.4x10^{-2}$	6
100	51	6	Benzyl alcohol	$1x10^{1}$	26	$4x10^{4}$ (17°C)	15
100	44	7	Benzyl chloride	$2x10^{-4}$	5	$3.3x10^{3}$	6
7440	41	7	Beryllium	$1x10^{-3}$	27		
111	44	4	Bis(2-chloroethyl)ether	$3x10^{-5}$	5	$1.02x10^{3}$	6
108	60	1	Bis(2-chloroisopropyl ether)	1	4	$1.7x10^{3}$	6
117	81	7	Bis(2-ethylhexyl)phthalate	$3x10^{-3}$	5	$4x10^{-1}$	11
75	27	4	Bromodichloromethane	$3x10^{-4}$	5	$4.7x10^{3}$ (22°C)	22
74	83	9	Bromethane	$5x10^{-2}$	4	$1.0x10^{3}$	18
85	68	7	Butyl benzyl phthalate	7	4	2.9	10
88	85	7	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	$7x10^{-3}$	27	$5x10^{1}$	6
7440	43	9	Cadmium	$5x10^{-3}$	42		
75	15	0	Carbon disulfide	4	4	$2.94x10^{3}$	6
56	23	5	Carbon tetrachloride	$5x10^{-3}$	14	$7.57x10^{2}$	6
57	74	9	Chlordane	$2x10^{-3}$	42	$5.6x10^{-1}$	6
106	47	8	p-Chloroaniline	$1x10^{-1}$	4	$3.9x10^{3}$	24
108	90	7	Chlorobenzene	$1x10^{-1}$	42	$4.66x10^{2}$	6
510	15	6	Chlorobenzilate	$7x10^{-1}$	4	$1x10^{4}$	1
126	99	8	2-Chloro-1,3-butadiene (Chloroprene)	$7x10^{-1}$	26	$3x10^{2}$	1
124	48	1	Chlorodibromomethane	$4x10^{-4}$	5	$4.4x10^{3}$(22°C)	22
67	66	3	Chloroform	$6x10^{-3}$	5	$8.2x10^{3}$	6
95	57	8	2-Chlorophenol	$2x10^{-1}$	4	$2.85x10^{4}$(20°C)	15
107	05	1	3-Chloropropene (Allyl chloride)	$2x10^{-3}$	36	$1x10^{2}$	15

HEALTH-BASED LEVELS AND SOLUBILITIES FOR CONSTITUENTS OF CONCERN IN DELISTING PETITIONS
July 1991

CAS No.			Compound	HBL (mg/l)	Ref.	Solubility (mg/l) (in H_2O at 25°C)	Ref.
7440	47	3	Chromium	$1x10^{-1}$	42		
218	01	9	Chrysene	$2x10^{-4}$	8	$1.8x10^{-3}$	6
319	77	3	Cresols	2	4	$3.1x10^{4}$	6
57	12	5	Cyanide	$2x10^{-1}$	27		
94	75	7	2,4-Dichlorophenoxyacetic Acid (2,4-D)	$7x10^{-2}$	42	$8.9x10^{2}$	6
72	54	8	DDD	$1x10^{-4}$	5	$1x10^{-1}$	6
72	55	9	DDE	$1x10^{-4}$	5	$4x10^{-2}$	6
50	29	3	DDT	$1x10^{-4}$	5	$5x10^{-3}$	6
2303	16	4	Diallate	$6x10^{-4}$	26	$1.4x10^{1}$	6
53	70	3	Dibenz(a,h)anthracene	$7x10^{-7}$	8,17	$5.0x10^{-4}$	6
96	12	8	1,2-Dibromo-3-chloropropane	$2x10^{-4}$	42	$1.0x10^{3}$	6
74	95	3	Dibromomethane	$4x10^{-1}$	4	$1.3x10^{4}$	25
84	74	2	Di-n-butyl phthalate	4	4	$1.3x10^{1}$	6
95	50	1	1,2-Dichlorobenzene	$6x10^{-1}$	42	$1.0x10^{2}$	6
106	46	7	1,4-Dichlorobenzene	$7.5x10^{-2}$	14	$7.9x10^{1}$	6
91	94	1	3,3'-Dichlorobenzidine	$8x10^{-5}$	5	4	6
75	71	8	Dichlorodifluoromethane	7	4	$2.8x10^{2}$	6
75	34	3	1,1-Dichloroethane	$4x10^{-4}$	26	$5.5x10^{3}$	6
107	06	2	1,2-Dichloroethane	$5x10^{-3}$	14	$8.52x10^{3}$	6
75	35	4	1,1-Dichloroethylene	$7x10^{-3}$	14	$2.25x10^{3}$	6
156	59	2	cis-1,2-Dichloroethylene	$7x10^{-2}$	42	$3.5x10^{3}$	6
156	60	5	trans-1,2-Dichloroethylene	$1x10^{-1}$	42	$6.3x10^{3}$	6
75	09	2	Dichloromethane	$5x10^{-3}$	27	$2.0x10^{4}$	6
120	83	2	2,4-Dichlorophenol	$1x10^{-1}$	4	$4.6x10^{3}$	6
78	87	5	1,2-Dichloropropane	$5x10^{-3}$	42	$2.7x10^{3}$	6
542	75	6	1,3-Dichloropropene	$2x10^{-4}$	5	$2.8x10^{3}$	6
60	57	1	Dieldrin	$2x10^{-6}$	5	$1.95x10^{-1}$	6
84	66	2	Diethyl phthalate	$3x10^{1}$	4	$8.96x10^{2}$	6
56	53	1	Diethylstilbesterol	$7x10^{-8}$	26	$1.3x10^{4}$	15
60	51	5	Dimethoate	$7x10^{-3}$	4	$2.5x10^{4}$	6
119	90	4	3,3'-Dimethoxybenzidine	$3x10^{-3}$	26	$2x10^{3}$	1,23
119	93	7	3,3'-Dimethylbenzidine	$4x10^{-6}$	26	$7x10^{1}$	1,23
57	97	6	7,12-Dimethylbenz(a)-anthracene	$1x10^{-6}$	20	$4.4x10^{-3}$	6
105	67	9	2,4-Dimethylphenol	$7x10^{-1}$	4	$5.9x10^{2}$	9
131	11	3	Dimethyl phthalate	$4x10^{1}$	26	$4.3x10^{3}$	2
99	65	0	1,3-Dinitrobenzene	$4x10^{-3}$	4	$4.7x10^{2}$	6
51	28	5	2,4-Dinitrophenol	$7x10^{-2}$	4	$5.6x10^{3}$	6
121	14	2	Dinitrotoluene	$5x10^{-5}$	5,21	$1.32x10^{3}$	6
117	84	0	Di-n-octyl phthalate	$7x10^{-1}$	26	3	22
123	91	1	1,4-Dioxane	$3x10^{-3}$	5	$4.31x10^{5}$	6

HEALTH-BASED LEVELS AND SOLUBILITIES FOR CONSTITUENTS OF CONCERN IN DELISTING PETITIONS July 1991

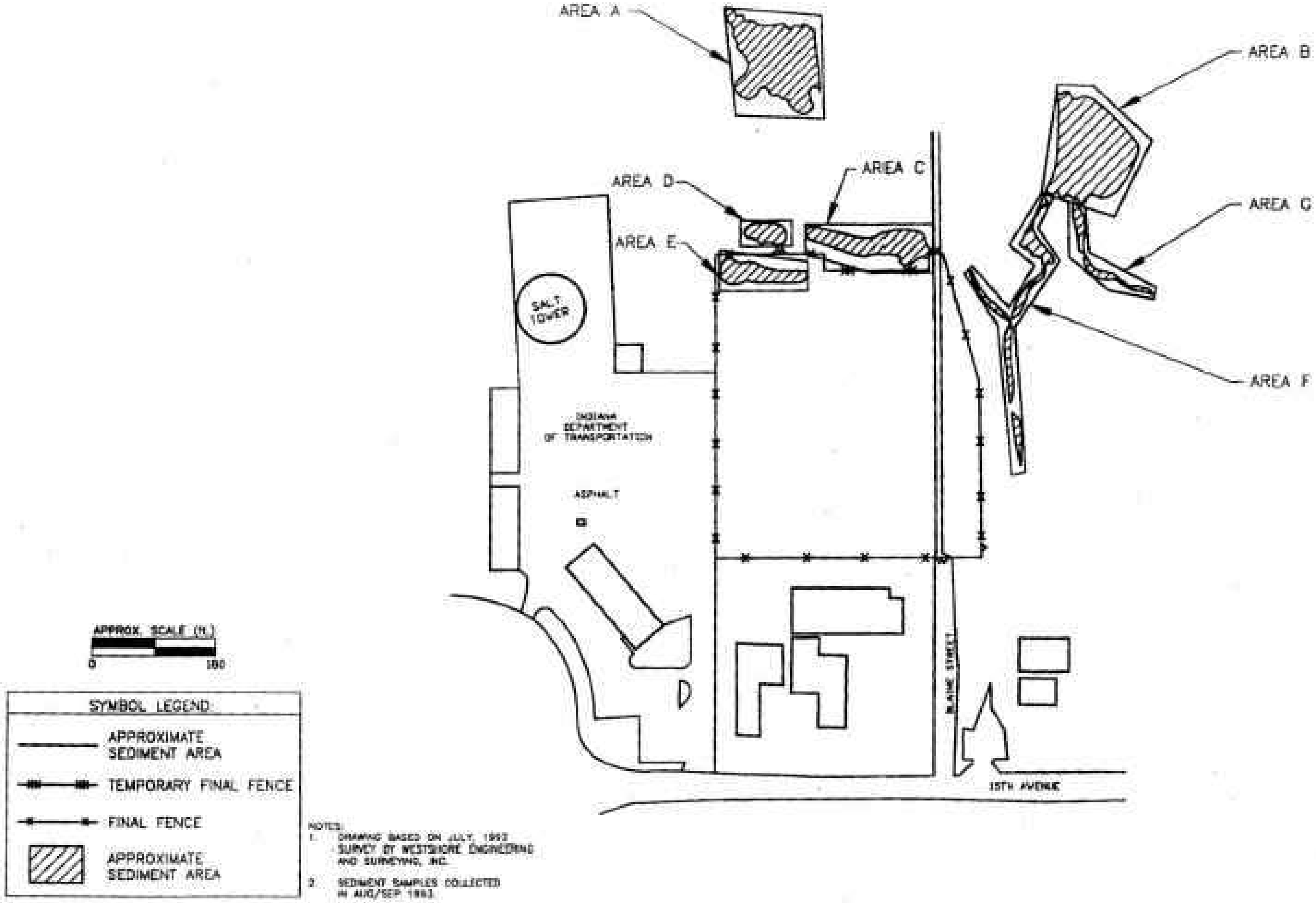
CAS	No.		Compound	HBL (mg/l)	Ref.	Solubility (mg/l) (in H_2O at 25°C)	Ref.
122	39	4	Diphenylamine	$9x10^{-1}$	4	$5.76x10^{1}$	6
122	66	7	1,2-Diphenylhydrazine	$4x10^{-5}$	5	$1.84x10^{3}$	6
298	04	4	Disulfoton	$1x10^{-3}$	4	$2.5x10^{1}$	24
115	29	7	Endosulfan	$2x10^{-3}$	4	$5.3x10^{-1}$	22
72	20	8	Endrin	$2x10^{-4}$	13	$2.5x10^{-1}$	22
106	89	8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	Treatment Technique	42	$6.0x10^{4}$	6
110	80	5	2-Ethoxy ethanol	$1x10^{1}$	26	$1x10^{5}$	1
100	41	4	Ethyl benzene	$7x10^{-1}$	42	$1.52x10^{2}$	6
60	29	7	Ethyl ether	$2x10^{1}$	4	$6.05x10^{4}$	12,2
106	93	4	Etylene dibromide	$5x10^{-5}$	42	$4.3x10^{3}$	6
97	63	2	Ethyl methacrylate	3	26	$7x10^{2}$	1,6
62	50	0	Ethyl methanesulfonate	$1x10^{-6}$	28	$3.69x10^{5}$	6
52	85	7	Famphur	$1x10^{-3}$	41	$1.43x10^{2}$	15
206	44	0	Fluoranthene	1	4	$2.06x10^{-1}$	6
86	73	7	Flurorene	1	4	1.69	6
16984	49	8	Fluoride	4	39		
64	18	6	Formic acid	$7x10^{1}$	4	$1x10^{6}$	6
76	44	8	Heptachlor	$4x10^{-4}$	42	$1.8x10^{-1}$	6
1024	57	3	Heptachlor epoxide (alpha, beta, gamma isomers)	$2x10^{-4}$	42	$3.5x10^{-1}$	6
118	74	1	Hexachlorobenzene	$1x10^{-3}$	27	$6.0x10^{-3}$	6
87	68	3	Hexachlorobutadiene	$4x10^{-4}$	5	$1.5x10^{-1}$	6
77	47	4	Hexachlorocyclopentadiene	$5x10^{-2}$	27	2.1	6
67	72	1	Hexachloroethane	$3x10^{-3}$	5	$5.0x10^{1}$	6
70	30	4	Hexachlorophene	$1x10^{-2}$	4	$4x10^{-3}$	6
319	84	6	alpha-HCH	$6x10^{-6}$	26	1.63	6
319	85	7	beta-HCH	$2x10^{-5}$	26	$2.4x10^{-1}$	6
193	39	5	Indeno(1,2,3,cd)pyrene	$2x10^{-4}$	8	$5.3x10^{-4}$	6
78	83	1	Isobutanol	$1x10^{1}$	4	$7.6x10^{4}$	3
78	59	1	Isophorone	$9x10^{-3}$	5	$1.2x10^{4}$	15
143	50	0	Kepone	$2x10^{-6}$	29	7.6 (24°C)	15
7439	92	1	Lead	$1.5x10^{-2}$	44		
58	89	9	Lindane (gamma-HCH)	$2x10^{-4}$	42	7.8	6
7439	97	6	Mercury	$2x10^{-3}$	42		
126	98	7	Methacrylonitrile	$4x10^{-3}$	4	$2.5x10^{4}$	15
67	56	1	Methanol	$2x10^{1}$	4	$>1x10^{6}$	1
72	43	5	Methoxychlor	$4x10^{-2}$	42	$4x10^{-2}$(24°C)	24
74	87	3	Methyl chloride	$3x10^{-3}$	26	$6.5x10^{3}$	6
56	49	3	3-Metylcholanthrene	$4x10^{-6}$	30		
78	93	3	Methyl ethyl ketone	2	4	$2.68x10^{5}$	6
108	10	1	Methyl isobutyl ketone	2	4	$1.91x10^{4}$	2

HEALTH-BASED LEVELS AND SOLUBILITIES
FOR CONSTITUENTS OF CONCERN IN DELISTING PETITIONS
July 1991

CAS No.			Compound	HBL (mg/l)	Ref.	Solubility (mg/l) (in H_2O at 25°C)	Ref.
80	62	6	Methyl methacrylate	3	43,26	$2.0x10^{1}$	6
298	00	0	Methyl parathion	$9x10^{-3}$	4	$6x10^{1}$	6
91	20	3	Naphthalene	$1x10^{-1}$	26	$3.4x10^{1}$	15
91	59	8	2-Naphthylamine	$4x10^{-5}$	31	$5.86x10^{2}$	6
7440	02	0	Nickel	$1x10^{-1}$	27		
98	95	3	Nitrobenzene	$2x10^{-2}$	4	$1.9x10^{3}$	6
79	46	9	2-Nitropropane	$4x10^{-6}$	26	$1.7x10^{5}$	38
924	16	3	N-Nitroso-di-n-butylamine	$6x10^{-6}$	5	$6.7x10^{3}$	1,23
55	18	5	N-Nitrosodiethylamine	$2x10^{-7}$	5	$4.1x10^{5}$	1,23
62	75	9	N-Nitrosodimethylamine	$7x10^{-7}$	5	$2x10^{2}$	1
156	10	5	N-Nitrosodiphenylamine	$7x10^{-3}$	5	$4.0x10^{1}$	10
621	64	7	N-Nitrosodi-n-propylamine	$5x10^{-6}$	5	$9.9x10^{3}$	1
10595	95	6	N-Nitrosomethylethylamine	$2x10^{-6}$	26	$2x10^{4}$	1
100	75	4	N-Nitrosopiperidine	$8x10^{-6}$	32	$>1x10^{6}$	6
930	55	2	Nitrosopyrrolidine	$2x10^{-5}$	5	$>1x10^{6}$	6
152	16	9	Octamethyl pyrophosphoramide	$7x10^{-2}$	26	$>1x10^{6}$	1
56	38	2	Parathion	$2x10^{-1}$	26	$2.4x10^{1}$ (20°C)	15
608	93	5	Pentachlorobenzene	$3x10^{-2}$	4	$1.35x10^{-1}$	6
82	68	8	Pentachloronitrobenzene	$1x10^{-1}$	4	$7.11x10^{-2}$	6
87	86	5	Pentachlorophenol	$1x10^{-3}$	19	$1.4x10^{1}$	6
108	95	2	Phenol	$2x10^{1}$	4	$9.3x10^{4}$	6
298	02	2	Phorate	$7x10^{-3}$	40	$5x10^{1}$	18
1336	36	3	Polychlorinated biphenyls	$5x10^{-4}$	42	$3.1x10^{-2}$	6
23950	58	5	Pronamide	3	4	$1x10^{2}$	1
129	00	0	Pyrene	1	4	$1.32x10^{-1}$	6
110	86	1	Pyridine	$4x10^{-2}$	4	$4x10^{4}$	1
94	59	7	Safrole	$1x10^{-4}$	33	$1.5x10^{3}$	6
7782	49	2	Selenium	$5x10^{-2}$	42		
7440	22	4	Silver	$5x10^{-2}$	13		
57	24	9	Strychnine and salts	$1x10^{-2}$	4	$1.56x10^{2}$	6
100	42	5	Styrene	$1x10^{-1}$	42	$3x10^{2}$	15
95	94	3	1,2,4,5-Tetrachlorobenzene	$1x10^{-2}$	4	6	6
630	20	6	1,1,1,2-Tetrachlorethane	$1x10^{-3}$	26	$2.9x10^{3}$	6
79	34	5	1,1,2,2-Tetrachloroethane	$2x10^{-4}$	5	$2.9x10^{3}$	6
127	18	4	Tetrachloroethylene	$5x10^{-3}$	42	$1.5x10^{2}$	6
58	90	2	2,3,4,6-Tetrachlorophenol	1	4	$1x10^{3}$	6
3689	24	5	Tetraethyl dithiopyro-phosphate	$2x10^{-2}$	4	$3x10^{1}$	25
7440	28	0	Thallium	$2x10^{-3}$	27		
108	88	3	Toluene	1	42	$5.35x10^{2}$	6
95	80	7	Toluene-2,4-diamine	$9x10^{-5}$	34	$4.77x10^{4}$	6

HEALTH-BASED LEVELS AND SOLUBILITIES FOR CONSTITUENTS OF CONCERN IN DELISTING PETITIONS July 1991

CAS No.			Compound	HBL (mg/l)	Ref.	Solubility (mg/l) (in H_2O at 25°C)	Ref.
823	40	5	Toluene-2,6-diamine	7	7	$1.3x10^{5}$	1
95	53	4	o-Toluidine	$1x10^{-4}$	26	$7x10^{2}$	1,23
106	49	0	p-Toluidine	$2x10^{-4}$	26	$7.4x10^{3}$ (21°C)	15
8001	35	2	Toxaphene	$3x10^{-3}$	42	$5x10^{-1}$	6
93	72	1	2,4,5-TP (Silvex)	$5x10^{-2}$	42	$1.4x10^{2}$	2
75	25	2	Tribromomethane (Bromoform)	$4x10^{-3}$	5	$3.01x10^{3}$	6
120	82	1	1,2,4-Trichlorobenzene	$9x10^{-3}$	27	$3.0x10^{1}$	6
71	55	6	1,1,1-Trichloroethane	$2x10^{-1}$	14	$1.5x10^{3}$	6
79	00	5	1,1,2-Trichloroethane	$5x10^{-3}$	27	$4.5x10^{3}$	6
79	01	6	Trichloroethylene	$5x10^{-3}$	14	$1.1x10^{3}$	6
75	69	4	Trichlorofluoromethane	$1x10^{1}$	4	$1.1x10^{3}$	6
95	95	4	2,4,5-Trichlorophenol	4	4	$1.19x10^{3}$	6
88	06	2	2,4,6-Trichlorophenol	$3x10^{-3}$	5	$8.0x10^{2}$	6
93	76	5	2,4,5-Trichlorophenoxy- acetic acid (2,4,5-T)	$4x10^{-1}$	4	$2.4x10^{2}$(30°C)	2
96	18	4	1,2,3-Trichloropropane	$2x10^{-1}$	4	$4x10^{3}$	1
76	13	1	1,1,2-Trichlor-1,2,2- trifluoroethane	$1x10^{3}$	4	$1x10^{1}$	6
99	35	4	sym-Trinitrobenzene	$2x10^{-3}$	4	$3.5x10^{2}$	2
126	72	7	Tris(2,3-dibromopropyl) phosphate	$3x10^{-5}$	35	$1.2x10^{2}$	6
7440	62	2	Vanadium	$21x10^{-1}$	26		
75	01	4	Vinyl chloride	$2x10^{-3}$	14	$2.67x10^{3}$	6
1330	20	7	Xylene (mixed)	$1x10^{1}$	42	$1.98x10^{2}$	6
7440	66	6	Zinc	7	26		



MIDCO REMEDIAL CORPORATION
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20127-02

FIGURE 1

APPROXIMATE SEDIMENT AREA EXCAVATION BOUNDARIES
MIDCO I SITE
GARY, INDIANA

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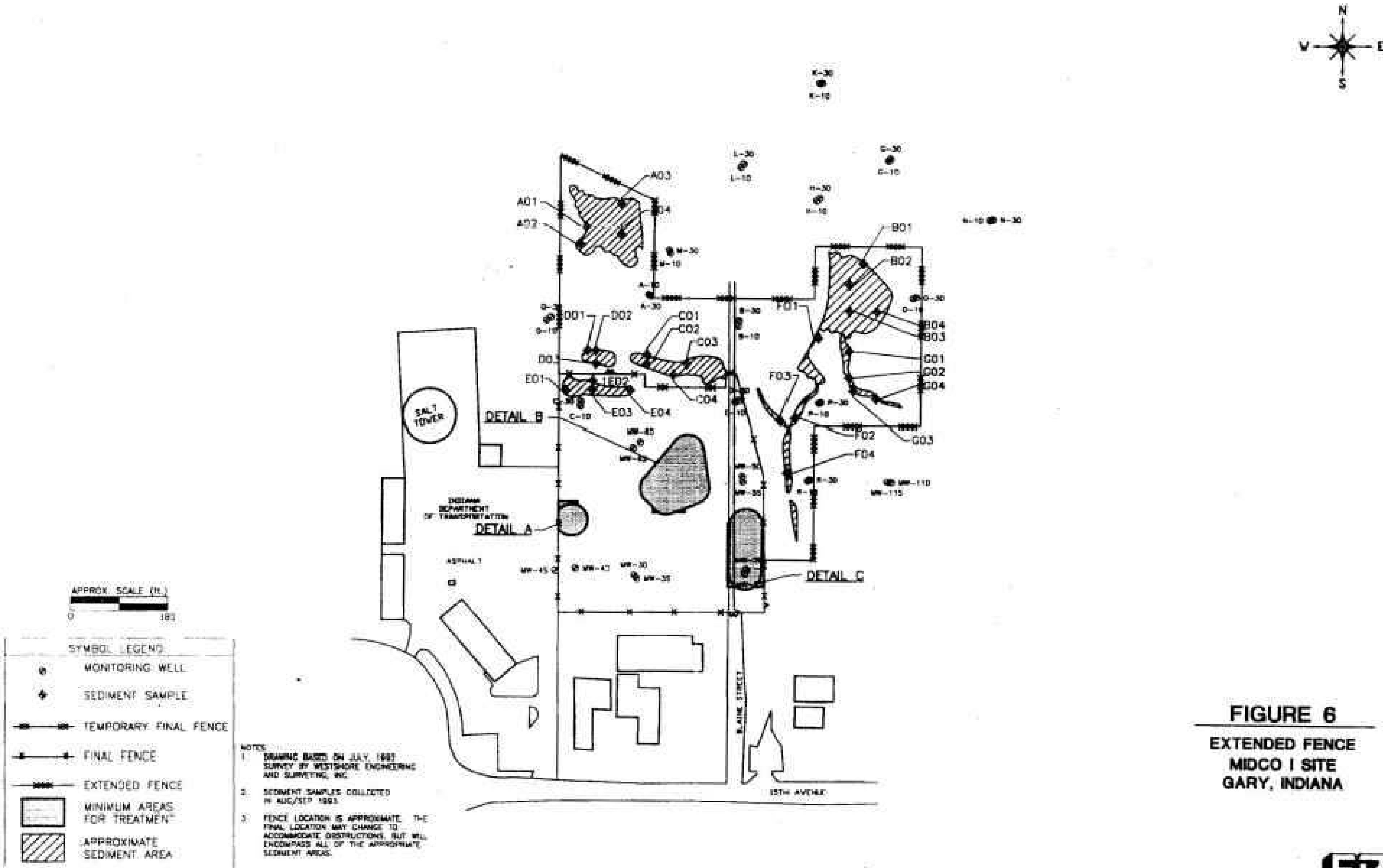

FIGURE 6

EXTENDED FENCE
MIDCO I SITE
GARY, INDIANA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION V

DATE: December 1, 1997

SUBJECT: Comments on the Sediment Excavation Report, Midco I and II Sites, Gary, Indiana, December 17, 1993

FROM: Edward Karecki, U.S. Fish and Wildlife Service Biologist EK

TO: Richard Boice, Remedial Project Manager

Thank you for the opportunity to review this report. My comments on the Midco I confirmatory sampling are listed below:

The confirmatory samples for Midco I indicate that contamination still remains in the sediments following excavation. For this evaluation I assumed a total organic carbon concentration of 1% for the remaining sediments, since the excavation may have removed much of the organic matter. I compared the remaining sediment contaminant levels with toxicity benchmarks for aquatic macro invertebrates (organisms which live in sediment).

The levels of contamination in samples A01, A02, A04, B04, E03, F02, F04, G02, G03, and G04 exceed levels of contamination which would likely cause severe effects to the aquatic macro invertebrate community, and are indicative of a polluted system. The contaminants which would be expected to cause the effects include: chrysene, phenanthrene, total PAHs, lead, manganese, chromium, copper, and nickel. Total PAHs are not easily compared with toxicity benchmarks, however, I believe that the total PAHs level in B04, E03, F02, G03, and G04 would cause severe effects to aquatic invertebrates.

The following table compares maximum detected levels with sediment toxicity reference values.

Contaminant	Maximum	Concentration	Toxicity Reference Value
Chrysene	16 mg/kg	(G03)	4.6 mg/kg (Ontario invertebrate severe effect level)
Phenanthrene	11 mg/kg	(G03)	9.5 mg/kg (Ontario invertebrate severe effect level)
Lead	621 mg/kg	(F04)	250 mg/kg (Ontario invertebrate severe effect level)
Manganese	1,700 mg/kg	(A01)	1,000 mg/kg (Ontario invertebrate severe effect level)

Chromium	1,190 mg/kg	(E03)	110 mg/kg (Ontario invertebrate severe effect level)
Copper	1,320 mg/kg	(E03)	110 mg/kg (Ontario invertebrate severe effect level)
Nickel	531 mg/kg	(E03)	75 mg/kg (Ontario invertebrate severe effect level)

I would recommend that additional remediation occur in these areas if they are expected to remain viable as wildlife habitats. If these areas are not expected to remain as wildlife habitats, then it may be possible to fill these areas to prevent wildlife exposure, and mitigate for the wetland losses in a clean area.

If you have any questions, or would like to discuss the site further, please call me at (312) 353-3202. Please also take a minute to fill out the enclosed critique sheet and return it to Larry Schmitt (SR-6J).

References

Ontario Ministry of the Environment, Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, Prepared by D. Persaud, R. Jaagumagi, and A. Hayton, 1993.

cc: L. Schmitt

FIGURE 1

SITE LAYOUT SHOWING TARGET CAPTURE ZONE, EXTRACTION WELLS AND SHALLOW MONITORING WELLS MIDCO I SITE, GARY, INDIANA

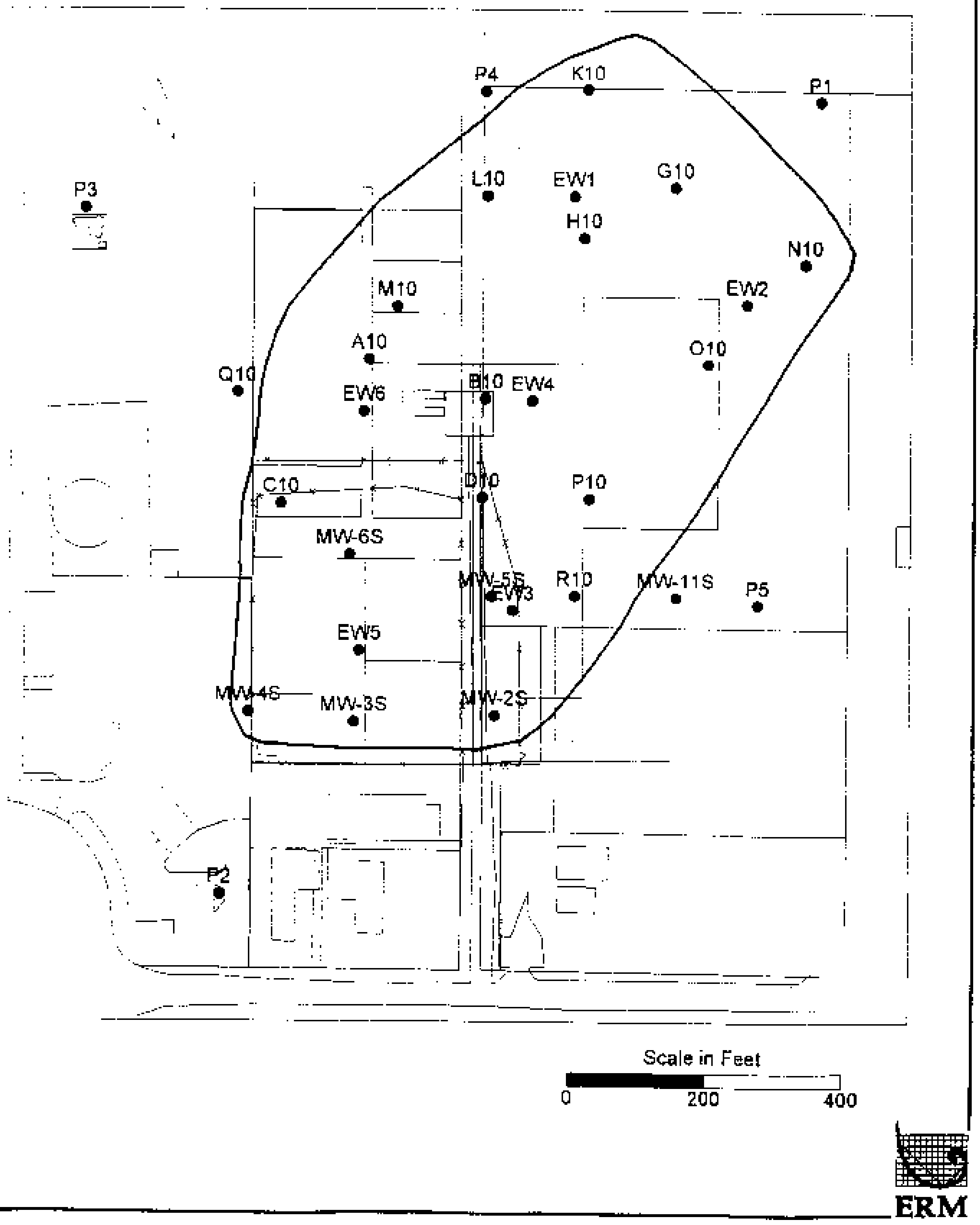

FIGURE 25

SHALLOW PIEZOMETRIC SURFACE AND CAPTURE ZONE OF SEPTEMBER 16, 1997 MIDCO I SITE, GARY, INDIANA

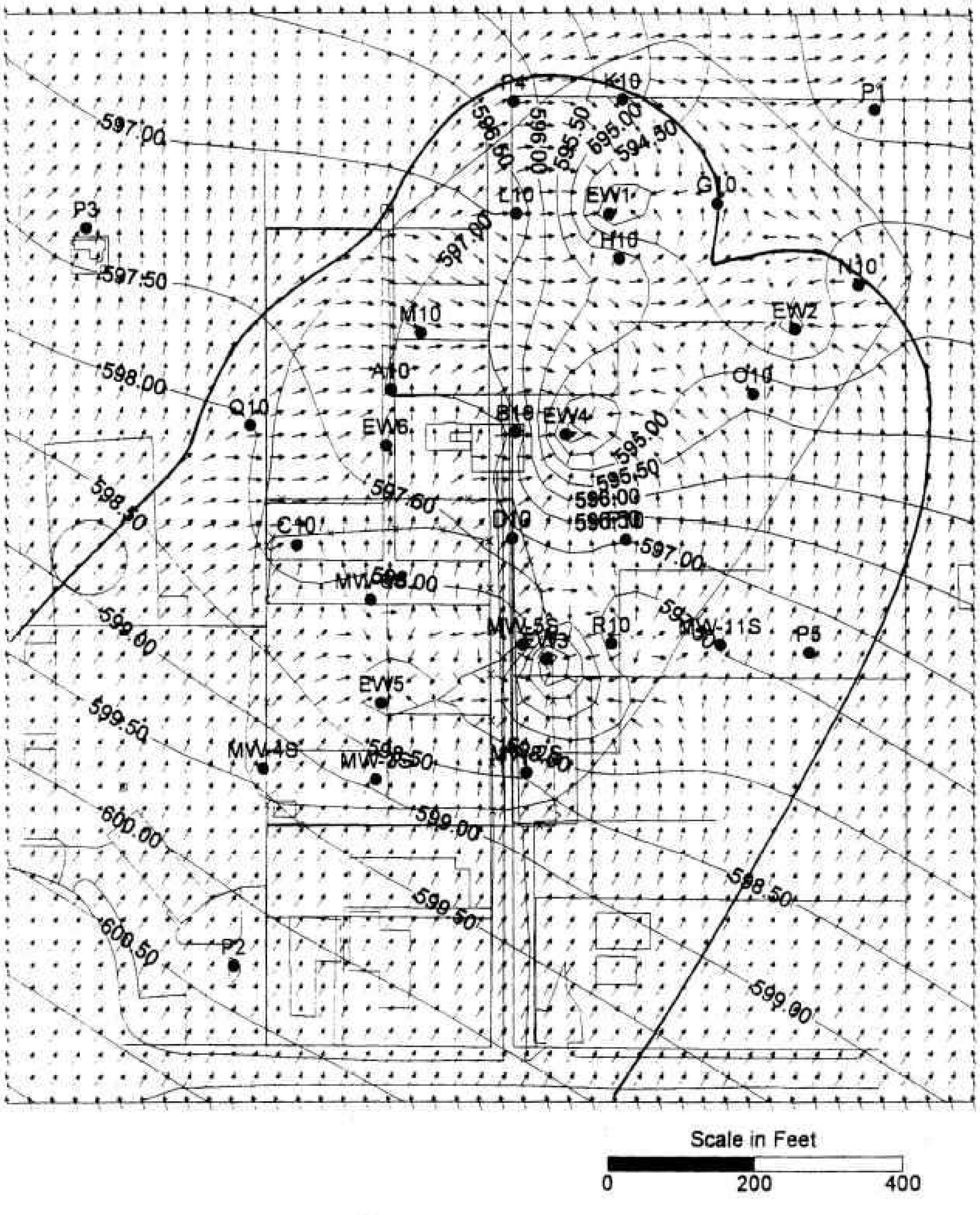

FIGURE 26

DEEP PIEZOMETRIC SURFACE AND CAPTURE ZONE OF SEPTEMBER 16, 1997 MIDCO I SITE, GARY, INDIANA

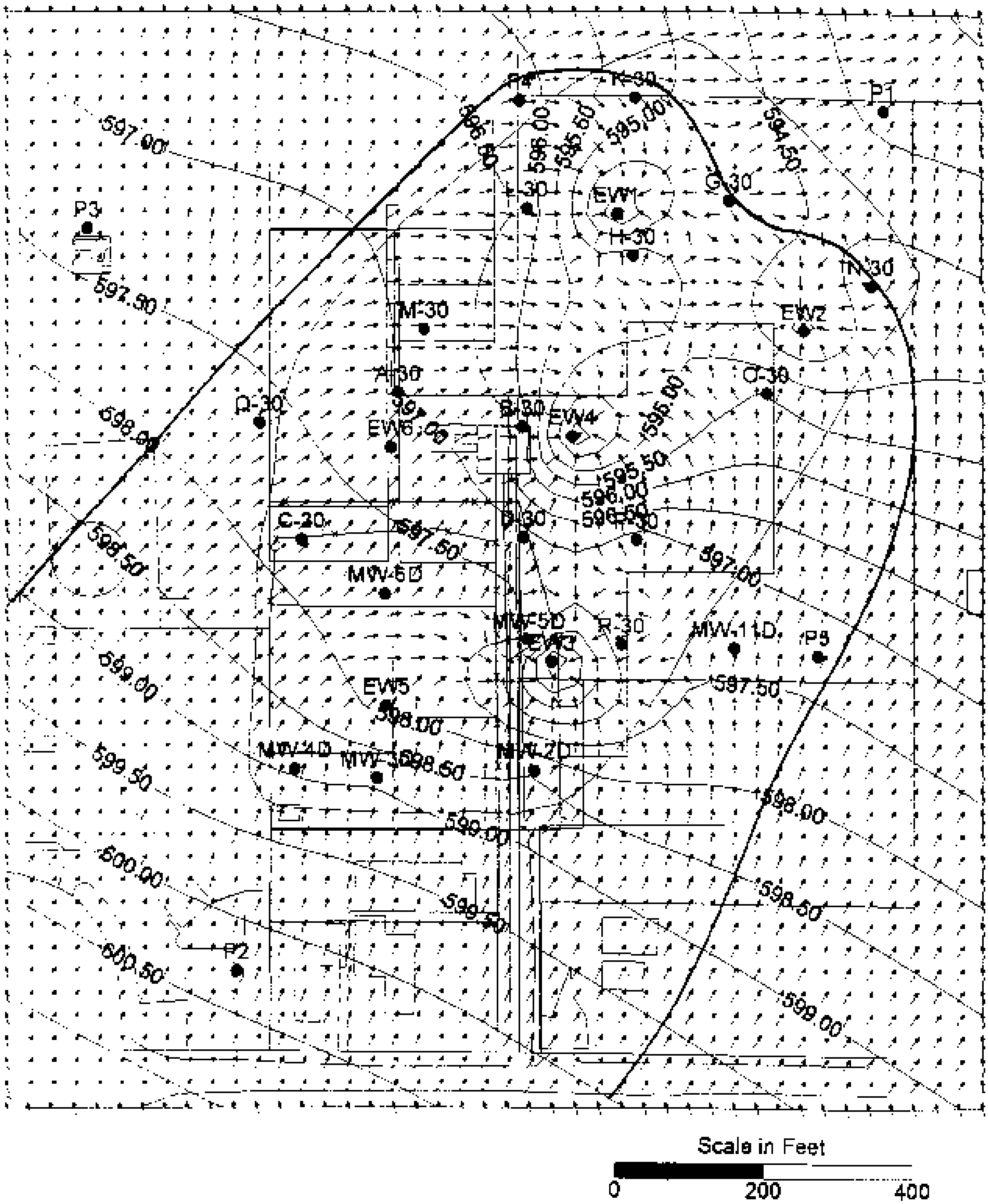

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TABLE 4-2
SUMMARY OF THE COMPARISON OF ANALYTICAL RESULTS WITH THE CLEAN-UP ACTION LEVELS (1,2)
MIDCO I SITE, GARY, INDIANA

Monitoring Well	Carcinogenic Risk (3) Total	Carcinogenic Risk (3) Contributing Parameters	Carcinogenic Risk (3) Concentration (µg/l)	Noncarcinogenic Risk (3) Total	Noncarcinogenic Risk (3) Contributing Parameters	Noncarcinogenic Risk (3) Concentration (µg/l)	Parameters at or Above MCL or AWQC: Parameter	Concentration (µg/l)	MCL (µg/l)	AWQC (µg/l)	Background Concentration (4) (µg/l)
MW-2S	3E-05	(5)		0.1			Benzene	8 J	5		
							Iron	9,540		3,900	3,880
MW-2D	2E-04	Vinyl chloride	2.0	0.2			Vinyl Chloride	2	2		1.32
		Carbon tetrachloride	1.0 J				Iron	4,080		3,900	3,880
		1,2-Dichloropropane	0.6 J				Mercury	0.10	2	0.0468	
		Trichloroethene	0.8 J								
		Benzene	0.6 J								
		Tetrachlorethene	1.0 J								
MW-3S	0E+00			0.001			Iron	9,300		3,900	3,880
MW-3D	0E+00			0.1			Mercury	0.27	2	0.0468	
MW-4S	0E+00			0.07			Chromium (III) (6)	419.0	100	858	8
							Cyanide	37.9 J	200	20.3	10.4
MW-4D	0E+00			0.2			Iron	6,360		3,900	3,880
MW-5S	0E+00			20	4-Methyl-2-pentanone	13,000	Toluene	44,000	1,000		
					Toluene	44,000	Ethyl benzene	2,500	700		
					Xylenes (total)	13,000	Xylenes (Total)	13,000	10,000		
					Ethyl benzene	2,500	Chromium (III) (6)	806	100	858	8
					Manganese	1,560	Copper	79.9		50.7	
					Nickel	171	Mercury	0.29	2	0.0468	
					Vanadium	31					
MW-5D	4E-06			0.0009							
MW-6S	1E-03	Benzene	180 J	7	4-Methyl-2-pentanone	3,600	Benzene	180 J	5		
		Arsenic	12.6 J		Nickel	1,780	Toluene	2,500	1,000		
					Arsenic	12.6 J	Chromium (III) (6)	522	100	858	8
					Barium	291	Copper	58.5		50.7	
					Vanadium	41.2	Iron	7,930		3,900	3,880
							Nickel	1,780		655	58
MW-6D	2E-05	(5)		0.1			Benzene	6	5		
							Iron	9,440		3,900	3,880
							Cyanide	20.8	200	20.3	10.4
MW-11S	2E-06			0.01			Chromium (III) (6)	123	100	858	8
MW-11D	2E-04	(5)		0.01			Vinyl chloride	2	2		1.32
							Mercury	0.1	2	0.0468	

TABLE 4-2
SUMMARY OF THE COMPARISON OF ANALYTICAL RESULTS WITH THE CLEAN-UP ACTION LEVELS (1,2)
MIDCO I SITE, GARY, INDIANA

Monitoring Well	Carcinogenic Risk (3) Total	Carcinogenic Risk (3) Contributing Parameters	Carcinogenic Risk (3) Concentration (µg/l)	Noncarcinogenic Risk (3) Total	Noncarcinogenic Risk (3) Contributing Parameters	Noncarcinogenic Risk (3) Concentration (µg/l)	Parameters at or Above MCL or AWQC: Parameter	Concentration (µg/l)	MCL (µg/l)	AWQC (µg/l)	Background Concentration (4) (µg/l)
A-10	0E+00			0.3			Iron	4,200		3,900	3,880
							Mercury	0.20	2	0.0468	
A-30	0E+00			0.4							
B-10	0E+00			0.00							
B-30	0E+00			0.1			Iron	6,200		3,900	3,880
C-10	0E+00			0.4			Chromium (III) (6)	109	100	858	8
							Mercury	0.14	2	0.0468	
							Cyanide	133	200	20.3	10.4
C-30	4E-06			0.2			Iron	7,300		3,900	3,880
D-10	5E-04 (5)			0.05			Benzene	140	5		
							Iron	14,200		3,900	3,880
							Cyanide	23.8	200	20.3	10.4
D-30	1E-05 (5)			0.6			Iron	14,700		3,900	3,880
G-10	0E+00			0.01			Mercury	0.10	2	0.0468	
G-30	0E+00			5	Barium	3,380	Barium	3,380	2,000		118
					Nickel	1,680	Iron	5,960		3,900	3,880
					Vanadium	74.7	Nickel	1,680		655	58
							Cyanide	28	200	20.3	10.4
H-10	0E+00			0.02			Iron	5,120		3,900	3,880
							Mercury	0.14	2	0.05	
H-30	0E+00			4	Barium	2,610	Barium	2,610	2,000		118
					Nickel	1,420	Iron	4,660		3,900	3,880
					Vanadium	72.4	Nickel	1,420		655	58
					Cyanide	90	Cyanide	90.0	200	20.3	10,4
K-10	0E+00			0.3			Chromium (III) (6)	171	100	858	8
							Iron	8,890		3,900	3,880
K-30	0E+00			0.3			Iron	4,320		3,900	3,880
							Mercury	0.14	2	0.0468	
L-10	0E+00			0.006							
L-30	0E+00			0.7			Iron	5,900		3,900	3,880
M-10	0E+00			0.02							
M-30	0E+00			0.3							
N-10	0E+00			0.06							
N-30	0E+00			0.8			Iron	4,370		3,900	3,880

TABLE 4-2
SUMMARY OF THE COMPARISON OF ANALYTICAL RESULTS WITH THE CLEAN-UP ACTION LEVELS (1,2)
MIDCO I SITE, GARY, INDIANA

Monitoring Well	Carcinogenic Risk (3) Total	Carcinogenic Risk (3) Contributing Parameters	Carcinogenic Risk (3) Concentration (µg/l)	Noncarcinogenic Risk (3) Total	Noncarcinogenic Risk (3) Contributing Parameters	Noncarcinogenic Risk (3) Concentration (µg/l)	Parameters at or Above MCL or AWQC Parameter	Concentration (µg/l)	MCL (µg/l)	AWQC (µg/l)	Background Concentration (4) (µg/l)
O-10	0E+00			0.3			Iron	14,800		3,900	3,880
O-30	0E+00			0.9			Chromium (III) (6)	145	100	858	8
							Iron	7,220		3,900	3,880
P-10	3E-04 (5)			0.4			Benzene	75	5		
							Iron	19,800		3,900	3,880
P-30	0E+00			0.0008							
Q-10	0E+00			0.1			Chromium (III) (6)	168	100	858	8
Q-30	0E+00			0.2			Iron	7,920		3,900	3,880
R-10	0E+00			0.002							
R-30	0E+00			0.2			Mercury	0.11	2	0.05	

Key:

µg/l = Micrograms per liter
MCL = Maximum Contaminant Level MCL's were obtained from 40 CFR Sec. 141
AWQC = Aquatic Water Quality Criteria. Obtained from Table 2 of Attachment 2 of the Statement of Work
J = The concentration is approximate due to limitations identified during the quality assurance review
CFR = Code of Federal Regulations

(1) All parameters detected below the background concentrations were not considered, as established in Attachment 2 of the Statement of Work.
(2) The complete validated data tables and risk calculation tables are included in Appendices C and D, respectively.
(3) Parameters are shown only if the cumulative risks for the location are above the acceptable carcinogenic risk of 1E-05 or above the acceptable noncarcinogenic risk of 1, and:
- Parameters produce individual carcinogenic risks above 1E-05, or they produce individual carcinogenic risks higher than 1E-06 and their sum produces a cumulative carcinogenic risk above 1E-05; or
- Parameters produce individual noncarcinogenic risks above 1, or (for parameters with the same effects) they produce individual noncarcinogenic risks above 0.1 and their sum produces a cumulative noncarcinogenic risk above 1.

(4) The background concentrations were obtained from Table 1 of Attachment 2 of the Midco I and II Statement of Work, dated June 1992.
(5) The carcinogenic or noncarcinogenic risk calculated for this location is above 1E-05 or 1, but it is produced by a single analyte for which an MCL has been promulgated (the list of parameters per sampling locations and risk type is included in Appendix B). In accordance to Attachment 2 of the Statement of Work, the analyte should not be included in the risk calculation, and its clean-up action level should be the corresponding MCL.
(6) The MCL is for total chromium and the AWQC is for trivalent chromium. The value detected was analyzed for total chromium; however, because no hexavalent chromium was found in the sample, this result corresponds to trivalent chromium.

TABLE 4-3
SUMMARY OF THE TARGET COMPOUND LIST/TARGET ANALYTE LIST RESULTS
AND COMPARISON WITH PREVIOUSLY COLLECTED DATA (1)
MIDCO I SITE
GARY, INDIANA

Parameter	1998 Annual Ground Water Monitoring			1997 Annual Ground Water Monitoring			1996 Annual Ground Water Monitoring			1993 Predesign Investigation			1986-87 Remedial Investigation	
	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration
Volatile Organic Compounds														
Chloromethane				15/40	250 J	MW-5S	12/40	0.4 J	P-10					
Vinyl chloride	3/40	2	MW-2D, MD-11D	11/40	650 J	MW-5S	6/40	170 J	C-10	5/40	2,200 J	MW-5S	1,500	D-10
Chloroethane	5/40	40	B-30	11/40	180	B-30	13/40	190	B-30	8/40	130 J	D-10	1,200	D-10
Methylene chloride													320,000	MW-5
Acetone	7/40	16 J	G-30	9/40	46 J	N-30	5/40	2,500 J	MW-6S	8/40	1,400 J	MW-6S	30,000 B	MW-6
Carbon disulfide				5/40	0.9 J	MW-11S	5/40	0.6 J	MW-11S	2/40	1 J	MW-11S		
1,1-Dichloroethene													4.3 J	B-10
1,1-Dichloroethane	1/40	1	R-10	9/40	320 J	MW-5S	8/40	270	C-10	4/40	34 J	P-10	800	C-10
cis-1,2-Dichloroethene	1/40	2,500	MW-5S	5/40	620 J	MW-5S	5/40	160 J	C-10	7/40	860 J	MW-5S		
trans-1,2-Dichloroethene				2/40	0.5 J	MW-5D	3/40	22 J	C-10	1/40	71 J	D-10	7,700	MW-5
Chloroform				1/40	3 J	B-10							1,300	MW-3
1,2-Dichloroethane				16/40	0.6 J	C-30							21 N	J-30
2-Butanone	1/40	4 J	D-30	4/40	18,000 J	MW-5S	3/40	4,100 J	MW-6S	6/40	4,200 J	MW-6S	80,000 J	MW-6
1,1,1-Trichloroethane				2/40	1,300	C-10	1/40	300	C-10	1/40	400 J	C-10	6,300	C-10
Carbon tetrachloride	2/40	1 J	MW-2D	1/40	170	C-10								
1,2-Dichloropropane	2/40	0.6 J	MW-2D											
Trichloroethene	2/40	0.8 J	MW-2D	2/40	35 J	C-10	2/40	36 J	C-10	2/40	0.8 J	MW-5D	380	MW-2
Benzene	11/40	180 J	MW-6S	13/40	920 J	MW-5S	14/40	620	MW-3S	11/40	3,300 J	D-10	6,800	MW-3
4-Methyl-2-pentanone	4/40	13,000	MW-5S	2/40	14,000	MW-5S	3/40	3,000 J	MW-5S	4/40	13,000	MW-5S	31,000	MW-5
2-Hexanone													110	D-20
Tetrachloroethene	2/40	1 J	MW-2D	2/40	24 J	C-10	1/40	32 J	C-10	1/40	15	MW-2D	370	MW-2
1,1,2,2-Tetrachloroethane										1/40	50	MW-6S		
Toluene	4/40	44,000	MW-5S	3/40	30,000	MW-5S	7/40	14,000	MW-5S	16/40	52,000 J	MW-5S	46,600	MW-5
Chlorobenzene	1/40	0.5 J	K-10											
Ethyl benzene	4/40	2,500 J	MW-5S	6/40	2,700	MW-5S	6/40	2,000	C-10	8/40	2,700 J	MW-5S	1,900	MW-2
Styrene										1/40	1	L-10		
Xylenes (Total)	5/40	13,000	MW-5S	7/40	12,000	MW-5S	8/40	10,000	C-10	11/40	18,000	C-10	7,000	C-10
1,4-Dichlorobenzene							2/40	0.1 J	MW-11D, H-10					
1,2,4-Trichlorobenzene	1/40	0.6 J	MW-10											

TABLE 4-3
SUMMARY OF THE TARGET COMPOUND LIST/TARGET ANALYTE LIST RESULTS
AND COMPARISON WITH PREVIOUSLY COLLECTED DATA (1)
MIDCO I SITE
GARY, INDIANA

	1998 Annual Ground Water Monitoring			1997 Annual Ground Water Monitoring			1996 Annual Ground Water Monitoring			1993 Predesign Investigation			1986-87 Remedial Investigation	
Parameter	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Frequency of Detection	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration	Highest Detected Concentration (μg/L)	Location of Highest Detected Concentration
Inorganics														
Aliminum	16/40	3,360	MW-6S	37/40	3,970 J	C-30	11/40	2,350	Q-10	22/40	3,370	P-10	41,300	I-10
Antimony				4/40	2.5	MW-6S	2/40	7.9	MW-6S	1/40	30.2	O-10	22 J	C-30
Arsenic	4/40	12.6 J	MW-6S	30/40	11.9	L-10	14/40	15.1	MW-6S	16/40	10.1	MW-6S	66 J	B-30
Barium	40/40	3,380	G-30	40/40	3,920	H-30	40/40	4,370	H-30	39/40	6,900	H-30	11,400	I-10
Beryllium	1/40	0.1	R-10				1/40	1.0	MW-6S					
Cadmium				6/40	2.2	MW-6S	3/40	1.3	MW-6S				22 J	C-10
Calcium	40/40	241,000	L-10	40/40	402,000	L-10	40/40	314,000	K-10	40/40	394,000	G-30	1,270,000	G-30
Chromium	38/40	806	MW-5S	40/40	644	MW-5S	40/40	369	MW-6S	35/40	486	MW-5S	2,270 J	MW-6
Cobalt	30/40	94.9	G-30	33/40	122	H-30	31/40	120	H-30	12/40	93.5	O-30	80	A-30
Copper	29/40	79.9 J	MW-5S	18/40	273	MW-5S	27/40	197	MW-5S	16/40	496	MW-5S	1,280	D-10
Iron	40/40	19,800	P-10	40/40	16,400	C-30	40/40	19,500	MW-5S	39/40	32,400	P-10	187,000	G-10
Lead	13/40	11.6	H-10	8/40	10.0	Q-10	9/40	12.2	Q-10	3/40	21.1 J	MW-5S	295 J	G-10
Magnesium	40/40	99,100	N-30	40/40	123,000	L-10	40/40	107,000	L-10	40/40	116,000	G-30	385,000	G-30
Manganese	40/40	2,020	O-10	40/40	1,650	MW-5S	40/40	1,460	MW-5S	40/40	2,470	P-10	6,810	G-10
Mercury	10/40	0.29	MW-5S							4/40	0.36	P-10	1.5	I-10
Nickel	40/40	1,780	MW-6S	40/40	2,080	H-30	39/40	5,610	MW-6S	29/40	4,880	MW-6S	21,900 J	MW-6
Potassium	40/40	218,000 J	H-30	40/40	199,000 J	G-30	40/40	254,000 J	H-30	40/40	81,000	G-30	486,000	I-30
Selenium				5/40	4.0	MW-6S	11/40	8.2	R-10				40 J	G-30
Silver													41 J	G-30,H-20
Sodium	40/40	9,000,000	H-30	40/40	10,700,000	H-30	40/40	11,000,000	H-30	40/40	9,330,000 J	G-30	27,600,000J	I-30
Thallium				1/40	4.3	H-30	6/40	5.6	A-30				50 J	B-30
Vanadium	38/40	82.7	L-30	31/40	62.7	H-30	36/40	55.6	H-30	16/40	59.2	L-30	150	A-30
Zinc	14/40	75.2 J	O-10	5/40	122	O-10	12/40	82.8	MW-5S	18/40	135	MW-5S	3,110 J	MW-6
Cyanide	10/40	133	C-10	20/40	1,830	C-10	21/40	1,370 J	MW-6S	29/40	544	C-10	3,670	MW-5
Chromium(VI)							2/40	430	A-30	3/40	20	O-10		

Key:

J = Estimated Value

B = Compound found in the laboratory blank and sample

N = Parameter did not meet all of the USEPA-defined identification criteria

USEPA = United States Environmental Protection Agency

(1) Blank spaces denote that: the parameters were below their respective quantitation limits, the data were rejected, or the parameters were not analyzed (1986-87 Remedial Investigation only)